ADDRESS

DELIVERED BEFORE THE FRANKLIN INSTITUTE,

OF THE STATE OF PENNSYLVANIA,

FOR THE PROMOTION OF THE MECHANIC ARTS, AT THE CLOSE OF THE

TWENTY-SECOND EXHIBITION

OF

AMERICAN MANUFACTURES,

BY

HON. WILLIAM D. KELLEY.

[Taken in Short-Hand by John J. McElhone, Congressional Reporter.]

It is an ungenerous response to the Committee whose courtesy invited me to appear before you on this interesting occasion, to commence my address, which should be precise in statement and deduction, with an apology for want of preparation. But so engrossing have been my public duties since the acceptance of their flattering invitation, that I have but been able to jot down loosely, without collocation, a few facts and figures, with which I hope to illustrate and enforce my views; and, relying on your indulgence, I must endeavor to arrange them as I proceed. Should I fail, despite the fertility of my theme, to interest or instruct you, I beg you will ascribe the failure not wholly to want of ability, but somewhat to this want of leisure, and in no degree to want of will on my part to give the occasion its just consideration and influence.

I know not with what feelings others have viewed the magnificent exhibition now drawing to a close, but I have not entered the halls without being deeply impressed by the power of man and the bounty of God, and with a deep sense of gratitude for the fact, that this land and this country are my country and my age. For increase of comfort, the gratification of taste, relief from pain—for all indeed that promotes the value of life, so far as material nature and the application of her laws can produce them—the ingredients and implements are there, each article an exponent of human power and the goodness of Him who giveth every perfect gift.

The future historian, who will not be content that thoughtful and observing men shall cast his volumes aside saying, as has been said of history, "that I know to be a lie," must depart from the beaten track—

must create his own model. The court and the camp no longer express the life of nations—the legislator and the soldier have ceased to shape their destinies; and the man who would write his name indelibly and prominently on this age, must shun the polluted arena of politics, and close his ears against the inviting notes of the trumpet. The forge, the field, the laboratory, the dingy workshop—the too often cheerless home of inventive genius—and the implements of science and art, are to be the theatre and means of future usefulness deserving fame. Indeed, the worthy historian of the last century and a half, when he shall arise, gathering his facts from collections of individual biography, wherein alone they have as yet been written, will chronicle the doings of the inventor, the engineer, the designer, and the mechanic, and indicate the influence they have exercised as the cause of social and political changes.

My effort this evening will be to increase your estimate of the value of the Franklin Institute, by attempting to demonstrate that the inventor, engineer, designer, and mechanic, have not only shaped the life of nations, for the last century, but imparted to them their full measure of vitality. A few groups of names, facts and figures, will illustrate a law as well as the largest catalogue time would furnish. Our country, young as American society is, would afford many illustrations of the fact I urge, and will present some of those on which I rely; but in our hot-blooded youth, the flush of which we still feel—with opportunity for enterprise inviting us on every hand—with new undertakings challenging us each day, and new successes goading us ever on to new endeavors, we have failed to collect and classify the statistics of our growth and development. Besides, to judge of the effects produced by newly created causes, we must have a past in which they did not exist, with which to contrast the present and intermediate periods. I turn, therefore, to England, the most mature, powerful, and uniformly stable of the European nations, for most of my illustrations.

The landed or agricultural has ever been the favored interest of the English government. The land of the country, held in immense tracts and entailed, was the basis of the aristocracy. Its owners constituted one branch of the national legislature. Cities and towns were dreaded as hotbeds of sedition, and the government resorted to many expedients to prevent their growth. To this course it was also stimulated by the dread of a redundant population—of a population so augmented that the productive power of the country would be found inadequate to its sustenance.

At the commencement of the fifteenth century, the population of England numbered about 4,000,000. There was then to be found in the statute book a law—not in dead letter merely, but which was vigilantly enforced—providing that all those who had been brought up to the plough till they were twelve years of age, must continue in husbandry throughout their lives. To evade this statute, and give them, as the phrase goes, a chance in the world, agricultural laborers parted with their sons in tender childhood, apprenticing them in distant cities for half the term of their minority. To counteract this evasion of the intent of the law—to maintain an adequate supply of farm labor, and to restrict the growth of towns, parliament determined to deny the mass of people the enjoyment of this privilege even at so painful a price, and further provided that "no person, unless possessed of land of a rental of twenty shillings a year, should bind a child, of any age, apprentice to any trade or mystery within a city, but that children should be brought up in the occupation of their parents, or other business suited to their condition."

In view of the then limited population, it may be doubted whether the government believed that the productive power of the country was unequal to the adequate support of its natural increase. Permit me, therefore, to turn again to the statute book. Toward the close of the 16th century the population of England was estimated at but 4,500,000. In 1581, Queen Elizabeth sanctioned a law forbidding the erection of new buildings within three miles of the gates of the city of London, and limiting the number of inmates of a house to the members of one family. Seven years later, came an act entitled "An Act against the erecting and maintaining of cottages;" which, after reciting "that great inconvenience had been found by experience to accrue by the erecting and building of a great number of cottages, which were daily more and more increasing in many parts of this realm," provided, "that for the time to come no such tenement shall be erected, unless four acres of land be attached to it." In 1638, Charles I. issued a special commission for the enforcement of the provisions of this statute. To the same end he issued two proclamations in 1630.* The first, "for preventing a dearth of corn and victual," appealing to the religious sentiment in the members of the royal household, the principal nobility and gentry, and the members of the universities and inns of court, reminds them that it was an old custom to take no suppers on Fridays or the eves of fast days, nor Wednesdays and Saturdays in Ember week, nor in Lent, and he commands the more general observance of it, and that the meat be appropriated to the relief of the poor;—the other prohibits the erection of buildings upon new foundations in London, or Westminster, or within three miles of the city or the King's palaces. This remarkable document also forbade the receiving of lodgers in houses, which, it said, "would multiply the inhabitants to such an extent that they neither could be governed or fed."

About a century after the period in which these royal and legislative efforts to repress population, and maintain adequate provision for the sustenance of the community, were promulgated, there came in that country, and our own, then yet in its colonial condition, a generation of men of whom less than half a score were to remodel society, and influence the destiny of nations for centuries, although no one of them was either soldier or statesman. Richard Arkwright, James Watt, Robert Peel, Edmund Cartwright, Eli Whitney, and Robert Fulton, were of the same generation. Arkwright the senior was born in 1732, and Fulton and Whitney, the junior members of the illustrious group, in 1765; and assuming thirty-three years as the average duration of human life, they may be fairly classed as of the same generation. James Brindley, though he was their contemporary, belonged to the preceding generation; having entered his sixteenth year when Arkwright, a laborer's thirteenth child, first saw the light of day. Fulton, who, gifted alike with genius and generous enthusiasm, dimly foresaw the consequences which must follow the labors of his compeers, said "that Arkwright, Watt, and Whitney, were the three men who did most for mankind of any of their contemporaries." Enlarging his group as I have done, he might without exaggeration have added they did more to enlarge the human family, promote its comfort, and improve the commerical, political, and social relations of men and communities, than had been done by the same number of men in the same brief period since time began. Though for the most part unknown to each other, they were co-laborers for a common end. The work of each was the complement of that of all the rest; and when thus considered, furnishes beautiful evidence of the way in which God works out his providence in his own good time, and by his appointed instrumentalities.

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* An order in council of the same year, directs courtleets to take cognizance of those "that goe in good clothes, and fare well, and none knowes whereof they live; those that be night-walkers, *builders of cottages, and takers in of inmates.*"

Peel put his carding machine into operation in 1762; Watt patented his steam-engine, and Arkwright his spinning-frame, in 1769; Cartwright, the power-loom in 1787 ; Whitney, the cotton-gin in 1793 ; and Fulton received his first patent in 1794. The Sankey brook, the first modern canal in England, was commenced in 1755. It may be said that its construction was accidental; it was certainly an after-thought; the company by whom it was constructed having been chartered for the purpose of rendering navigable the Sankey brook, which flows into the Mersey from the neighborhood of the now flourishing town of St. Helens, in Lancashire—a distance of about twelve miles, through a district abounding in coal. Brindley, as engineer of the enterprising Duke of Bridgewater, begun his first canal in 1758, and witnessed the passage of the first boat over its whole length—seven miles—on the 17th July, 1760.

In 1780, eighty-two years ago, the population of England having increased about 3,000,000 in three centuries, was but 7,953,000. Slight and gradual as was this increase of mouths to be fed, bodies to be clothed, and families to be housed, it strengthened the general apprehension of redundant population, and, if I may use the phrase, crystalized its expression into a body of dogmas, known as the Malthusian philosophy. But now, despite the efforts of legislators, the dogmas of pseudo-philosophers, and the intermeddling of the British Government in the wars of continental Europe, the annual rate of increase began to grow apace, so that in 1831 England contained 13,894,574 people, which number has since been swollen to over 16,000,000. To the followers of Malthus these figures must be frightful indeed. Yet it may be safely affirmed that the population of England, to which over 8,000,000 of souls have been added in eighty years, are better fed, better clothed, and better educated, intellectually, morally, and spiritually—have a more free and wider field of enterprise in health, are better cared for in sickness, and more decently buried when dead, than the people of the island ever were before—blessings for which they are indebted to the group of men I have named, and those who have labored with or after them in promoting the useful arts and sciences.

Permit me now to glance at the growth and development of the cotton manufacture in England. I fear, ladies, that I shall weary you with dates and statistics. But, unhappily, the flowers of rhetoric are not embraced by my limited botany, and my theme invites but few figures of speech.

Yet if you will bear with me, you may find our subject full of poetry. Is it not wonderful how the obscure man of toil and thought, begrimed by the smut of coal and iron—his familiar spirits—makes the wilderness to blossom as the rose, and subjects the lightning, wind, and waves to the will of man? Wool was carded by hand when the first Sir Robert, then plain Mr. Peel, a manufacturer, invented his carding machine. At the time of the invention of the frame by Arkwright, cotton (except for weft, which was spun by the jenny of James Hargrave, a carpenter,) was spun by the distaff and wheel; at the time Cartwright perfected his power-loom, the hand-loom was the only means of weaving, and when the web was more than three feet wide, two men were constantly stationed beside the loom, one to throw the shuttle from right to left, and the other to throw it back from left to right. In those days, says Mr. Guest, in his History of the Cotton Manufacture, "it was no uncommon thing for a weaver to walk three or four miles in a morning, and call on five or six spinners, before he could collect weft to serve him for the remainder of the day."*

Though the American cotton crop was then inconsiderable, there was no lack of the raw material. The demand was for carders, spinners, and weavers. But when the inventions of Peel, Arkwright, and Cartwright were brought effectively into operation, and when Watt had added the steam engine, which, while consuming three tons of coal, puts forth as much power as a healthy man of ordinary physical capacity does, while laboring eight hours per day for twenty successive years, the condition of things was changed. When iron, coal, and water assumed the province of laborers, a supply of the raw material became the desideratum, and it seemed not improbable that an adequate supply would be unattainable. For, notwithstanding the increased demand for the article, the culture of cotton was, at about that period, abandoned by many of those who had engaged in it. Eli Whitney, having quit his New England home, and gone to Georgia as a teacher, was the guest of a distinguished and hospitable lady, residing near Savannah. At her table one day "a party of gentlemen having fallen into conversation upon the state of agriculture among them, expressed great regret that there was no means of cleansing the green seed cotton, or of separating it from its seed, and remarked that until ingenuity could devise some machine which would greatly facilitate the process of cleansing, it was in vain to think of raising cotton for the market." Whitney at once busied himself in preparations for the required machine, and before the winter was over, had produced his gin, which, from the hour it went into effective operation, has enabled one man to do the work of a thousand by the old method.

In 1720, the manufactories of England consumed 2,000,000 lbs. of cotton. From the beginning of 1771 to the close of 1774, the consumption averaged 4,764,589 lbs. per annum. By 1780 the influence of machinery begun to be felt, and the consumption reached about 7,000,000 lbs. Five years later, steam was used as a power for spinning cotton thread, and about the close of that, and the commencement of the current century, it was applied to weaving; and in 1800, 56,000,732 lbs. were consumed. By 1825, under the impulse of steam and improved machinery, the amount consumed reached 228,005,291 lbs., and at the end of another period of 25 years, in the years 1851-2, it grew to be about 990,000,000 lbs., or 2,200,000 bales, averaging about 450 lbs. each. Nor does this indicate the extent of England's power to consume that one foreign product. Her statesmen no longer dread redundant population. Machinery, vindicating the ways of Providence, has swept away the cobweb theories of material philosophy. Labor is in demand and wages rising. And when the fear is expressed, that too many of England's 16,000,000 of people, will be drawn off to America, Australia, or elsewhere, her statesmen rejoice in the fact, that she can obtain a supply of skilled laborers from the continent.

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* The Cotton Manufacture had, however, even then aroused the jealousy of the landed interest, who were also the wool growers; and in 1720, to protect, as it was alleged, the Silk and Woolen Manufactories, "the use of printed calicoes in apparel, household stuffs, or furniture," was prohibited by law.

From 1720 to 1800, England had scarcely a competitor in this branch of manufactures. She has one now in America, whose factories "work up" about one-third as much of the raw material as her's do, while French fabrics consume about as much as those of the United States. And here permit me to remark, with the purpose of recurring to the topic again, that the quantity of cotton we work up, fabricated in France, produces nearly treble the sum obtained for ours, and French goods command a higher price than English goods of the same texture and weight of fabric in London, Liverpool, or Manchester. Yet, despite this competition, London, the increase of which was so dreaded, is growing faster than any other city in the world, and the increase of population in the commercial towns and manufacturing districts of England, is equalled only by that of our own most prosperous and improving cities and districts.

Here let me turn again to the statute book to ascertain whether the assertion, that her people are more thoroughly provided for now than they were heretofore, is correct. The statute of 1363, which for a century regulated the diet and wages of laborers, directs, "that artificers"—meaning thereby what we recognise as mechanics—"shall be served once a day with meat or fish, or the *waste* of other victuals, as milk or cheese." Sir Edward Coke tells us that in 1596, "rye bread and oatmeal formed a considerable part of the diet of servants in great families." Such servants were, doubtless, better fed than artificers. In the grant of a monopoly by Charles I., in 1626, "barley bread" is said to be "the usual food of the ordinary sort of people." And Mr. Smith, the author of Tracts on the Corn Trade, tells us that "in 1760, wheat had become more generally the food of the common people than it had been in 1689"—but he adds a doubt whether more than half the people of England fed on wheat in 1720. To know how applicable these descriptions would be now, let us consult M'Culloch's Dictionary of Commerce. "Wheat bread," says that work, "is now universally made use of in towns and villages, and almost universally in the country; barley is no longer used, except in distilleries, and in brewing; oats are employed only in the feeding of horses; and the consumption of rye-bread is comparatively inconsiderable. The produce of the wheat crop has been, at the very least, trebled since 1760." With such authorities before them, the most sceptical will not doubt the fact asserted.

How is it that England, over-populated by four millions of people, can sustain thus liberally four times that number? Why is it that she can buy half the annual cotton crop of the world, and feed those who work it into fabrics upon wheat gathered upon the shores of the distant Baltic, and the banks of the more distant Mississippi? Is it not because she is the depository of coal and iron, and therefore the field in which the labors of the inventor, engineer, designer, and mechanic can be made most effective? Let us see. Prior to 1760, the development of the mineral resources of the island had scarcely begun. Steam, though not unknown as a motive power, was unmanageable and unapplied, except for the purpose of pumping. England was essentially an agricultural country, with but few eminent advantages over the continental States. But about ninety-four years ago, two men traversed the ground between Worsley and Manchester, a distance of seven miles, including the passage of the Irwell, a navigable stream which crossed their path, scanning closely the elevations and depressions of the ground they were traversing; they doubtless spoke of the Sankey brook canal, then just opened, by which coal from its vicinity was carried the enormous distance of twelve miles, so cheaply, that the mines from which it had been taken, though unavailable heretofore, could now be worked with profit. The younger of those men was Francis, Duke of Bridgewater, whose coal beds at Worsley, though inexhaustible, were unavailable. They were seven miles from Manchester, and the cost of carrying coal so great a distance made it impossible to work them. His companion was James Brindley, a stonemason and millwright, who, it is said, never learned the difficult art of reading, and who was taught to write his name mechanically, that he might sign some of the most important contracts ever made in England—a genius whom God created, society neglected, and nature trained. Short as the proposed canal would be, the obstacles to its construction appeared to ordinary minds insuperable. It was doubtful whether a competent supply of water could be obtained; and should it be procured, men of reputation denied the possibility of carrying it over the Irwell without interfering with the navigation of that river. To overcome the first difficulty, Brindley proposed to construct an immense basin in the bosom of a mountain, and procure a supply of water by draining neighboring mines and tapping neighboring springs. To guard the interest of those engaged in navigating the Irwell, he would tunnel from the basin to the surface of the mountain, at such an elevation, that the aqueduct by which he would cross the river, would be above the truck of the loftiest mast; by thus carrying his canal in part through the deep and solid rock, and in part high above the valley, he would avoid the necessity of locks and the waste of water consequent upon their use. Wise men laughed at Brindley's folly, and prudent ones endeavored to dissuade his noble patron from the ruin toward which an enthusiast was leading him.* But, as I have already said, the canal was begun and finished. The wonders achieved in the construction of that short canal attracted the attention of the public. New undertakings of a similar character were projected, and Parliament was besieged for charters. Commissions were appointed to inquire into the expediency of granting the charters; and Brindley, when asked by a member of a commission, what he thought rivers had been made for? replied—"To feed canals!" A startling answer; which is, however, relieved of much of its apparent exaggeration, by comparing the rivers of England with our wide and far rolling streams. Thenceforth his employment upon such works was incessant, and he lived to see his country traversed in all directions by means of cheap transportation by water. In thus connecting her mineral districts and her midland country with her numerous seaports, he contributed immensely to the present greatness, and manufacturing and commercial supremacy of England. I have not been able to ascertain the amount of coal raised annually in England before the construction of her canals; but now, when her internal improvements are the most complete and perfect in the world, it is, in conjunction with that of Wales, about 35,000,000 tons, or about eleven miles square of a bed of coal three feet thick.

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* Another engineer was called in and consulted, before the work was determined upon. Brindley took him to the proposed site of the aqueduct, and endeavored to explain how he meant to execute the work; but he only shook his head and remarked, that "he had often heard of castles in the air, but never before was shown where any of them were to be erected."

The labors of Brindley were necessary to give efficiency to the inventions of Arkwright, Peel, Cartwright, Watt, Whitney, and Fulton. Without coal cheap, accessible, and in abundance, the steam engine would have been paralyzed in its infancy. The canals he projected and constructed, not only furnished the manufacturing districts with an abundant supply of cheap fuel, but connecting them and the agricultural districts with the seaports, stimulated commerce, and sending her ships laden with the products of her people, and her engines, into every sea, secured to England the commercial supremacy of the world. Steam is the cheapest and most effective of known motive powers; coal is essential to its production; iron to its application. Industry, mechanical skill, and means of cheap and rapid communication and transportation, make these available, and herein consist the key to England's commercial and manufacturing supremacy, as well as to her power to sustain her augmented and increasing population.

The greatness and power of England are the fitting monuments of her ingenious, enterprising, and laborious sons. The memory of the hero of Waterloo, gone recently to an honored and illustrious grave, will be long and justly cherished as that of the soldier of his age; but how do his victories compare with those achieved by the humble men I have named. In their moments of revery, no gaping wounds or mangled forms of men rose before their view, the fancied echo of no widow's sob or orphan's cry penetrated their ear, as in such moments they must have haunted every manly hearted soldier. Military story is a sanguinary narrative:—the number of the slain swells the surviving hero's glory. It points you to bounteous harvests, the farmer's hope, the people's future sustenance, ripening under the genial influence of a June sun, as was that which waved over the fertile plains of Belgium, trampled by contending armies, clotted thick with human blood, and buried like that of Waterloo deep under the torn and broken bodies of husbands, fathers, sons, and brothers. Poverty, widowhood, orphanage, decrepitude, and desolation of home and heart, are the concomitants of military glory. Not so was it with the victories achieved by the daring genius and enduring efforts of the men whose praise I speak. Theirs were triumphs which angelic hosts might sing. They have converted the wilderness into the abodes of civilization, art, and religion; regenerated old nations, and filled their lands with teeming millions; shadowed every sea with the wings of commerce, burdening their big waves with the elements of life, comfort, and joy; and bound the nations of the world together by ties of mutual dependance, which decay not, but strengthen with each day's increase of international commercial intercourse.

But leaving England, and turning to our own country, let us note a small measure of our indebtedness to the inventor, the engineer, and the mechanic. Could the facts and figures be collected, it would not, I apprehend, be difficult to show that the effects of the labors of the few men I have named have been as marked and beneficent in the United States as in that country. In England they enabled the land to sustain a teeming population. In the United States, Brindley, Watt, Fulton, and Whitney, have given the people, come from where they might, land to dwell upon. We have seen that the culture of cotton was likely to be abandoned in Georgia as an unsuccessful experiment by reason of the cost of seeding; and we have also seen that the coal on Sankey brook and at Worsley, was not mined by reason of the expense involved in carrying it to a market. When the expense of the production and conveyance to market of any given commodity, equals its market value, the production must cease; and land, the crop from which cannot be sold at a profit, is unsuited to the habitation of man. In new countries, therefore, settlement is always upon the banks of rivers, nature's highways; and as population increases, settlement moves slowly to the interior. Bearing these simple truths in mind, and remembering that the magnificent rivers of the Mississippi valley are tideless; and that the planter descending to New Orleans, with a load of produce, had to sell his boat as well as his cargo, and, with his men, return to his home by stage coach or on foot, often consuming months in the journey; and say, if you can, how much of the land of the West now teeming with prosperous and intelligent people, must have remained for centuries unoccupied, had no canals been constructed, no steam engine invented, or the means of applying it to the propulsion of boats and trains of cars not been discovered. It is scarcely a figure of speech to say that Whitney gave fertility to the cotton region of the South; that Brindley, Watt, and Fulton are developing the coal and iron regions of Pennsylvania, and the lead and copper regions of Lake Superior and the upper Mississippi; and that Peel, Arkwright, and Cartwright, are even now creating new markets for the produce of the fertile valleys of the West; and availing ourselves of the fruits of their genius, Philadelphia is becoming the greatest manufacturing city of America, and Pennsylvania more populous and prosperous than any of her sister States.

This is not the language of enthusiasm. Facts confirm it; look for instance at the anthracite coal trade of Pennsylvania. It is the work of our own generation. Thirty-two years have not elapsed since the first anthracite coal was brought as merchandise to Philadelphia. In 1821, the amount mined averaged one ton for each day in the year; I will not, however, trace its annual progress, but note its amount in every fifth year.

It amounted in	1821	to	365 tons.
"	1825	"	34,893 "
"	1830	"	174,734 "
"	1835	"	560,758 "
"	1840	"	841,584 "
"	1845	"	1,975,113 "
"	1850	"	3,285,980 "

I can advance no further by protracted intervals. In 1851, it reached 4,383,730 tons, showing an increase in one year of 1,097,950 tons, or 21,301 tons more than the entire product of 1842.

The amount of iron produced in the United States this year will exceed a million of tons. The product of Pennsylvania will probably reach 300,000 tons. These facts are the sure prophecies of the future greatness of our beloved City and State. When steam and machinery do the work, factories are brought into close proximity to the coal mine and ore bed. In the days of manual labor, the South of England, Essex, Sussex, and Kent, was the seat of the woolen and silk factories; but they have all emigrated to the North, where coal and iron are to be obtained most cheaply; as those of the United States will one day concentrate within or upon the borders of Pennsylvania. In obedience to a law of nature, the chief coal and iron region of the Union must become the principal source of its commercial and national grandeur, and the seat of its most compact and thrifty population.*

The United States is now the vigorous competitor of England for commercial supremacy. Her authorities, whether we look to the Times or to Punch as an exponent of their opinion, freely admit that Brother Jonathan, in whom they are beginning to recognise a highly respectable younger brother, has taught them some valuable lessons in ocean navigation and commercial enterprise. None of their yachts built in imitation of the America or on original models, have attained her speed with a sailing breeze; three American steamers have crossed the Atlantic in less time than the fastest English steamer has made the trip; the clipper ships of English register, which are now bearing her flag most fleetly across wide oceans, are of American timber and American structure; and the shipbuilders of New York and Boston, as time permits, build such vessels for the English market, and on English order. And if her commercial supremacy is ever to be shaken, it must be done by the enterprise and energy of that people who were the first to meet her successfully in armed strife on that element over the wide wastes of which her meteor flag had been the emblem of majesty for centuries.

But why may not Pennsylvania ere long dispute her manufacturing

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* Rich and various as are the inexhaustible mineral deposits of Pennsylvania, she is withal the greatest wheat-growing State in the Union. Ohio and New York are next in the scale. In 1850, the last year for which I have returns, they produced respectively as follows:

Pennsylvania,	15,482,191 bushels.
Ohio,	14,967,056 "
New York,	13,073,357 "

and shake her commercial supremacy? Her ships return to her freighted with golden tribute from every land, because they have carried the products of her mines, workshops, and factories to the people of every land. And why may not the people of Pennsylvania swell the commerce of our common country by competing successfully for the supply of foreign markets? Is it that there is less to stimulate us to new undertakings, or that the mass of our people, barbarous and illiterate, are incapable of executing them, or that we timidly shrink from enterprises of great pith and moment, or that even our master minds are incapable of conceiving such projects? I may, without incurring the suspicion of pandering to the vanity of my fellow citizens, reply to all such suggestions with an emphatic negative! In England the land is held in large tracts by few hands, and is of great price. Here it is abundant, and accessible to all who enjoy health, and practise industry and economy. There the humble man of genius encounters obstructions in the inadequacy of the means of popular education, in the existence of established orders of society, in immense accumulations of capital, and in the influence of rank and wealth in the management of affairs and the distribution of patronage. It is in despite of such hindrances that the man of genius rises there; yet he may rise; a Mr. Peel may become Sir Robert, and Dick Arkwright, the barber, honor the title of Sir Richard. Here the means of education are broad, deep, and general. Our public schools are open to all, and every man is the architect of his own fortune. The field of enterprise is invitingly open on every hand, and if the vocation to which a man has been bred, is not that for which he is best adapted, he may change it with facility. The poorest man, who pays a decent regard to the proprieties of life, is the peer of the proudest, and if gifted with genius beyond his fellows, the shame is his own if he do not rise in the scale of influence and consideration. In evidence of our capacity to conceive and execute great designs, I point to the magnificent links of railroad and canal by which sections of our State are traversed, and, in view of our imperfect means of intercommunication and transportation, to the amount and variety of our manufactured products, and the extent of our infant coal and iron trade. No, gentlemen, in these respects, as well as in the quantity and quality of her coal and iron,* Pennsylvania has the advantage of England. Nor are we wanting in inventive genius. The words and deeds of genius submit not to the limitations of time and place. They are enduring, and possess a quickening, aye, a creative power. It was not for his own age, Archimedes invented the screw. The daring and logical thoughts of the unlettered Brindley, will endure for the instruction of posterity as long as the mountains and valleys of England, in and over which they are so legibly written, and may be read in a fair transcript in the canals of our own commonwealth; and the carding-machines, frames, looms, and steam engines last constructed for our use, were but improvements of the principles embodied by Peel, Arkwright, Cartwright, and Watt. But were it otherwise—were inventive genius merely national—we need not despair of the great object proposed, while M'Cormick's reaper cuts our grain, Whitney's Gin cleanses our cotton, and Fulton's genius distributes them throughout the world—while Hobbs' lock remains unpicked, and Morse's telegraph speaks the language of every civilized people.

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* This fact is ascertained by scientific test and measurement.

You, gentlemen, of the Franklin Institute, have a clear perception of what is requisite to the speedy development of the resources and power of Pennsylvania, and effectually are your labors contributing to the supply of her most pressing wants. Your object is the promotion of the Mechanic Arts, and to this end your means are most liberally and judiciously addressed. Your system of investigating theoretically and by practical experiment, plausible propositions in mechanics and material science, propounded by men whose doubts are equal to their faith, or whom poverty disables from executing their own conceptions; your spirited and able Journal, diffusing knowledge of the results of experience and the speculations of genius; your large and well selected library, wooing the man of toil from too absorbing a pursuit of gain, counseling the already instructed man of science, and guarding the young and ardent inventor against a waste of time and means in the trial of plans and principles already tried and condemned; your courses of lectures, imparting in a most agreeable manner to youth from the workshops of our city, a knowledge of chemistry, mechanics, natural philosophy, and kindred subjects; and your school of design for young men; your well furnished reading room, and well appointed conversation rooms, constitute together a system of agencies most effective for the advancement of the material interests of our state and country. The aid you thus extend is not temporary or factitious. No political change can affect it, no legislative act withdraw it.

One of your appointed instrumentalities I have not named,—your annual exhibitions of the products of American skill, taste, and industry. Of the influence of these upon the fortunes of producers or the taste of the community, I need not speak. The people of Philadelphia thoroughly understand it. But I cannot deny myself the pleasure of mentioning a single pregnant illustration of the advantage exhibitors may derive from a judicious display of their wares. It will serve also to illustrate, gentlemen, how much beyond the limits of our own state and country the influence of your Institute is felt. It was my good fortune, thanks to the courtesy of my brethren, whose kindness I am happy thus publicly to acknowledge, to escape from the toils and cares of judicial duty during the past summer, when I made one of those rapid excursions which our countrymen, familiar with "magnificent distances," make to England and parts of the continent of Europe. The American resident abroad of whom I felt most proud, was a young friend, a native of the sparsely populated district in which I reside. It is a little more than six years, since Dr. Thomas Evans, whilst practising dentistry somewhat successfully in the little city of Lancaster, having prepared some specimens of his professional skill, and *made* a set of instruments, embracing some not known to the profession at large, determined to deposit them in the next Exhibition of the Franklin Institute. He did so; and during the exhibition, his work and instruments attracted the attention of a distinguished physician of Paris, then in this country, who sought his acquaintance, and pressed him to change his location from Lancaster to

Paris. This he also did; and while in that city I had the honor of dining at his table with a prime minister, whose special business was to negociate an interview between the most celebrated dentist of Europe and his sovereign. His majesty being unable for reasons of state to enter France, came as near as he could in the hope that the dentist would at least meet him half-way. But even monarchs are liable to some disappointments. The time of my friend was engaged for many days in advance; and his diary contained the names of many who, though not occupying thrones, are the familiars of those who do. Anxious to relieve the royal sufferer, and unable to attend him in person, he sent to his relief his assistant, the second surgeon dentist of Europe, his brother, who had then recently arrived from Philadelphia in Paris. I doubt whether any two men in the world, are privileged to shake so many crowned heads, or inflict so much pain on royal and noble personages, as these two young townsmen of ours. Nor is their celebrity factitious. The principal of the firm is the professional companion of the most illustrious surgeons of France, and was, within my knowledge, called by one of them, to perform an operation upon the jaw, from the execution of which he shrunk.*

I have now, gentlemen, laid before you, without method or precision, such facts as I could collect in support of the position, that it is the inventor, engineer, designer, and mechanic who give life to history, and direction to the progress of nations. We have seen that mechanical skill and industry, availing themselves of the coal and iron of England, have overthrown the most cherished theories of legislators; have reduced the favored agricultural to a subordinate interest; have exalted the proscribed business of manufacturing printed cottons, into a leading interest; have changed the location of trades and people; have, while quadrupling the population of England, enabled her to export annually $200,000,000 worth of cotton and woollen goods, and to our own country alone above 300,000 tons of iron per annum; and have sent her ships into every sea, and her agents into every land, that every sea and land may contribute to the wealth of a country, whose extent is less by thousands of square miles than that of Pennsylvania. But have we not also seen that *her internal improvements were pre-requisites to the greatness of England*? The possession of coal and iron and machinery will not in themselves enrich or exalt a people. The means of cheap and easy transportation of fabrics and raw material are necessary. The railroads and canals of England are the most thorough and perfect system of such works the world has ever seen. The several districts of the island are in close and easy communication with each other. Her inland districts are brought near to her seaports. Her importations of foreign goods go quickly and cheaply to the interior. It is not so with us. Our improvements are imperfect and incomplete. Our commonwealth is disjointed. Much of the interior, and all the north-western part of the State is without means of direct communication with the metropolis. The waters of the Delaware, the Ohio, and Lake Erie are ours. Our cities occupy commanding sites upon them all; yet the merchants of Pittsburg have, till recently, been the customers of Baltimore, and those of Erie and Philadelphia are still strangers to each other. So distant, indeed, is Erie from our city, that few of us are aware that the trade of the Lakes is greater in amount and value than the entire foreign commerce of the United States. Our railroads and canals must be completed, extended, and increased in number.[*]

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* Specimens of this gentleman's skill, exhibited at the World's Fair, were not labelled *Messieur le docteur Evans de Paris:* but, "Specimens of American Dentistry."

Thanks to our abundant mineral resources, the natural advantages of our position, the power of our innumerable steam engines, and the energy with which we execute undertakings in which we have determined to engage, Philadelphia is the most rapidly growing community on the American continent. But, gentlemen of the Franklin Institute, you must induce her people to prevent the erection of a Chinese wall around the city—to penetrate every section of the State with railroads and canals if they would have her hold the lead in the race for supremacy. She ought to be the manufacturer for the increasing millions of luxurious citizens of her sister sovereignties of the South and West, and compete with England in the markets of the world; and this she will do when railroads and canals afford the means of cheap, expeditious, and intimate communication between her and all other parts of the State and country, and ocean steamers diminish the distance between her docks and those of foreign lands. When these great objects shall be attained, Pennsylvania—richest of the confederated sisterhood in inexhaustible agricultural, mineral, and manufacturing resources—whose cities cast their shadows over the waters of the Mississippi Valley, the Lakes, and one of the noblest rivers that pours into the Atlantic—whose population is augmenting beyond precedent, increasing her Congressional representation, while that of every other State in the Union is stationary or receding—will dispute the manufacturing supremacy of England, and exhibit such a development of natural resources and human power as the world has not yet seen. Then, too, will Philadelphia assume her civic supremacy. Then will she speedily become what nature has decreed she must ultimately be—the great city of America—the London of the Western world.

Though conscious, ladies and gentlemen, that I am wearying you by the length of this rambling discourse, I must beg you to bear with me yet a little while. One other topic in which we should all feel a deep interest demands at least a passing notice on this occasion. You must

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[*] It appears from returns lying before us, that during the six months ending the 26th of August last (1848), there entered and departed from Camden station alone, 73,732 railway-wagon loads of goods! Now, in the annals of political economy, there can, perhaps, scarcely exist a more striking exemplification of the extraordinary extent to which the latent resources of a great country may be developed by diminishing the friction, or, without metaphor, by lowering the tolls of its goods-traffic, than the fact that, notwithstanding the enormous amount thus conveyed along the London and North-Western rails, the quantity carried along the Grand Junction Canal, *which meanders alongside its powerful antagonist*, instead of having been drained, as might have been expected to be so, has, from the opening of the railway in 1836, up to the present period, increased as follows:—

	Tons.
Average amount of goods annually moved on the Grand Junction Canal during the three years prior to the opening of the London and Birmingham Railway in 1836, ...	756,894
Average amount of ditto annually moved during the twelve years subsequent to 1836, ...	1,039,333
Amount moved in 1847, ...	1,163,466

Stokers and Pokers, by Sir Francis Head.

permit me to thank the members of the Franklin Institute for having assumed the charge of the Philadelphia School of Design for Females, and to express, gentlemen of the Institute, my sincere gratitude to the excellent lady who founded that school, and by her almost unaided efforts sustained it for years, preparing it to take its place among the more important and useful departments of your Institute.*

Our superior and more varied mineral resources—our superior measure of water power—our superior, and, if by means of adequate artificial roads, on which it may be cheaply transported, coal be made the fuel for our houses and factories—our inexhaustible supply of native timber—and our superior and infinitely more varied supply of native food, are the means whereby we have been enabled already to compete with our great rival in the production of coarse articles of utility. But, it is due to ourselves that we should exalt our aim. The age of mere utility has passed. Taste, exhibited in the production of articles of most common and general use, has a most appreciable market value. Though scouted as plodding and utilitarian, our age is one of refinement. Three centuries ago, the English laborer made his bed of straw upon the bare earth, the floor of his cabin. He knew not the luxury of a chimney; and the magnates of the land were strangers to the use of window glass.† Now the healthy man, whose labor is most poorly requited, gathers his family about him with gratitude to the man who invented chimney corners; and, if we peep through his well-glazed window, we may note the *designs* which embellish his carpet, and the stained paper with which the walls of his apartment are covered, if our attention be not arrested by the handsome frame of a good engraving, or elaborate certificate of membership in some beneficial or other association.

I have already said that the French manufacture about the same quantity of cotton as the American people, and obtain therefor a much higher price; and that French goods displace English goods, of the same weight and texture of fabric, in English markets. Let it not be said that this is the result of a senseless passion for foreign commodities. English and American manufacturers understand it otherwise;‡ and there is not a lady present, who has done an hour's shopping, that will not, choosing between foreign nations, pay more for French chintzes, de laines, and silks, than for English goods of the same weight to the square yard·

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* Mrs. Sarah Peters.

† According to Erasmus, the dwellings of the common people of England, in the time of Queen Mary, had not attained the convenience of a chimney to let out the smoke, and the flooring of their huts was nothing but the bare ground: their beds consisting of straw, among which was an ancient accumulation of filth and refuse, with a hard block of wood for a pillow.

The statute of laborers, of 1496, (II. Henry, vii. c. 22.) fixes the daily wages of free master bricklayers and glaziers at three-pence with diet, or five-pence without diet. This was the first statutory recognition of either of those trades. Sir F. Eden very much doubts whether glass, although it had long been the ornament of churches, was used at this time in private houses. In 1567, glass was such a rarity as not to be usually found in the castles of the nobility. It is probable glass windows were not introduced into farm houses much before the reign of James I.—*History of the Middle and Working Classes.*

‡ Mr. Lloyd, an extensive silk manufacturer, testified before the Select Committee on the School of Design, appointed in 1849, by the British Parliament, "that beauty of design will command a higher price, when the same weight of material, woven up in an inferior design, would not be worth perhaps more than half or two-thirds as much.

Passion for foreign products will not decide between the productions of several countries; and in this matter the ladies exercise a grave and sound discretion. The taste of the French people is cultivated. France throws wide open to the public all her immense collections of art. And Paris, with its varied attractions, offers to the eye of the observing traveler, few sights more gratifying than the number of modest-looking, graceful girls, who are to be seen daily in the public galleries, sketching and copying from the works of the great masters of all ages and every school of art. They are pupils or graduates of the schools of design, long since established by the French government. The application of the genius of her eminent artists to practical designing, and the cultivation of a love of the beautiful and graceful among her artizans, by France, have secured to the products of her factories a prëeminence in the markets of the world, which will not be shaken till the manufacturers of England and the United States learn to appreciate the commercial value of taste. The people and government of England begin to understand this.* The government endowed a National School of Design in 1837, with a central department in London, and branches in some sixteen or twenty of the principal provincial manufacturing towns; and in 1842, it established the London School of Design for females, to the use of which it appropriated apartments in Somerset House. All these establishments are supported, in part, by voluntary contributions; but the government, besides annual appropriations of from three thousand to six thousand pounds sterling towards paying current expenses, has made a special appropriation of ten thousand pounds for the purchase of models and other appliances. Our government does not possess the power to appropriate the public money to such purposes; but, if private enterprise and beneficence do not adequately endow and sustain institutions having similar objects in view, we must be content to excel in the production of coarse fabrics alone.

But, gentlemen, this enterprise of yours is commended by far higher than merely commercial motives. It is a School of Design for Females; and its adequate endowment is no less urgently enforced by motives of humanity and impulses of philanthropy, than by the necessities of our manufacturing and commercial interests. I will not detain you by discussing the vexed question of woman's rights. Indeed, I am not certain that I understand precisely the issue between the contending parties. In general terms, I think the case may be stated thus: The advocates of woman's rights say that her sphere should be enlarged —that she should be enabled to procure, by her own industry and enterprise, her own sustenance during maiden-hood, widow-hood, or while bound to a worthless, lazy, or thriftless husband;—while the opposition assert that her natural position is that of dependence, and that the cradle and the needle are the symbols of her sphere. Here is a fair field for endless discussion. But let us avoid controversy by accepting the latter proposition. The cradle and the needle!—has not Hercules assumed the charge of them, now that the cradle goes by clock-work, and the sewing machine, driven by a steam engine, does most excellent stitching! "All you have to do," says the inventor of the self-rocking cradle, "is to wind it up as you would a clock, and give it a push, and the wife may start to church or market, confident that it will rock steadily for an hour and a half." And no thoughtful man can have listened to the "tick" of the sewing machine, now on exhibition, and observed the close regularity of its stitches, without having wondered what is to become of the present generation of depressed sewing women! Their vocation, if that machine will really do all that it promises, will follow those of the wool-comber and the hand-loom weaver; and the cherished "sewing basket" may follow the spinning-wheel to the attic, to lie until dragged forth, in the next century, for the purpose of shewing children how grand-mother employed her otherwise idle hours. But seriously, gentlemen, if the cradle and the needle are the symbols of woman's sphere, by promoting the mechanic arts you have most sadly invaded her domain; and it behooves you, to open to her, victim as she so often is of vicissitude and misfortune, new and wider resources. And what field more appropriate than the arts? Who so fit as woman to design embellishments for the house or person? No man, having built himself a dwelling, would venture without having consulted wife, sister, or cousin, to select paper for its walls, or carpets for its floors; and to say nothing of the many exquisite combinations and contrasts that may enter advantageously into the costume of a village or a ball-room belle, what man would attempt to select a picturesque costume for his prattling boy, and guarantee that he would not, when wearing it, look more like a monkey than a "father to the man," as Wordsworth has it? Nor is it alone in such matters that woman manifests her fitness for the training afforded by such a school. Are there not more female than male names in the list of Americans, whose perception and expression of the grand, the touching, and the beautiful in nature and life, may be truly called poetic? And, if this be true, we may fairly look for a like result in the kindred department of Art. Go on, then, gentlemen: assure to them a portion of this field—raise from the depressed laboring women the strata that press heavily upon them—open up to them new hopes in life—give new resources to those who, impelled by want, are losing their repugnance to the hideousness of vice and verging toward the haunts of shame and death, and the men of Philadelphia will not fail to sustain you. Make known your purposes. Make your demand for the means of adequate endowment in the names of commerce and humanity—and shame be to the man who, professing an interest in the welfare of the community or solicitude for its suffering classes, withholds his contribution proportional to his means.

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* See Appendix, page 19.

Again, gentlemen, I thank you for your efforts in this behalf. In adding to your many duties the cares of this School of Design for Females —making provision for those for whom no father or husband cares—you give fresh evidence of your desires to promote, not only the material welfare of your fellow-men, but the glory of Him, the Perfect Mechanic, who cutteth out rivers among rocks; and His eye seeth every precious thing— who bindeth the floods from overflowing; and the thing that is hid bringeth he forth to light—who looketh to the ends of the earth, and seeth under the whole heaven.

APPENDIX.

Extract from the Report from the Select Committee on the School of Design, made to the British Parliament, and ordered by the House of Commons to be printed, July 27th, 1849.

NATIONAL IMPORTANCE OF SCHOOLS OF DESIGN.

"Before entering on the special object of the present inquiry, your Committee think it right to express generally their sense of the value of Schools of Design, and of the benefits they are calculated to afford to the community at large. When sufficiently understood, properly organized, and made to realize a practical improvement in the decorative manufactures of the country, which was and is the specific ground of their establishment, these Schools, in the opinion of your Committee, may be justly regarded as of much national importance, useful alike in promoting commerce, education, and good morals.

"British manufactures, to a great degree, have a preference in foreign markets; but competition exists, and is extending itself both at home and abroad, and the success of this rivalry will be found in many instances to depend much more on the superiority of the decorative design than any other characteristic of foreign manufactures. Indeed, one of the witnesses, an extensive manufacturer, went the length of saying, 'Our salvation, as manufacturers, depends upon the Schools of Design being well carried out.'

"It is admitted that in all manufactured productions, decorative design has a positive value. In articles of luxury, indeed, design constitutes the primary feature of the manufacture; whilst even in those of mere utility, its value is frequently estimated higher than any mere excellence of fabric or cheapness. Mr. Lloyd, a silk manufacturer, observed, that 'beauty of design will command a higher price, when the same weight of material, woven up in an inferior design, would not be worth, perhaps, more than half, or two-thirds as much.' Compared with foreign manufactures, the productions of this kingdom, in most cases, rank equal, if not superior, in all other requisites but those of ornamental design and artistic execution. In silk fabrics, in which the French are such formidable competitors with ourselves, even in our own market, British manufacturers state that it is design alone which is wanted to enable them successfully to compete with their rivals.

"The evidence taken before your Committee, like that taken before the Committee on Arts and Manufactures, in 1836, has proved that the English manufacturer still copies ornamental design much more than he originates it, and that the foreign producer has a considerable advantage over him—not merely for a reputation for better taste in general, but for a knowledge of appropriate design in special manufactures, which even the superior make and cheapness, on the side of the English manufacturer, do not counterbalance. At the same time the evidence goes to show, that if English designs were as original and appropriate as foreign, English manufactures would be preferred almost universally. It is especially, therefore, in the supply of foreign markets, that design has a most important commercial bearing.

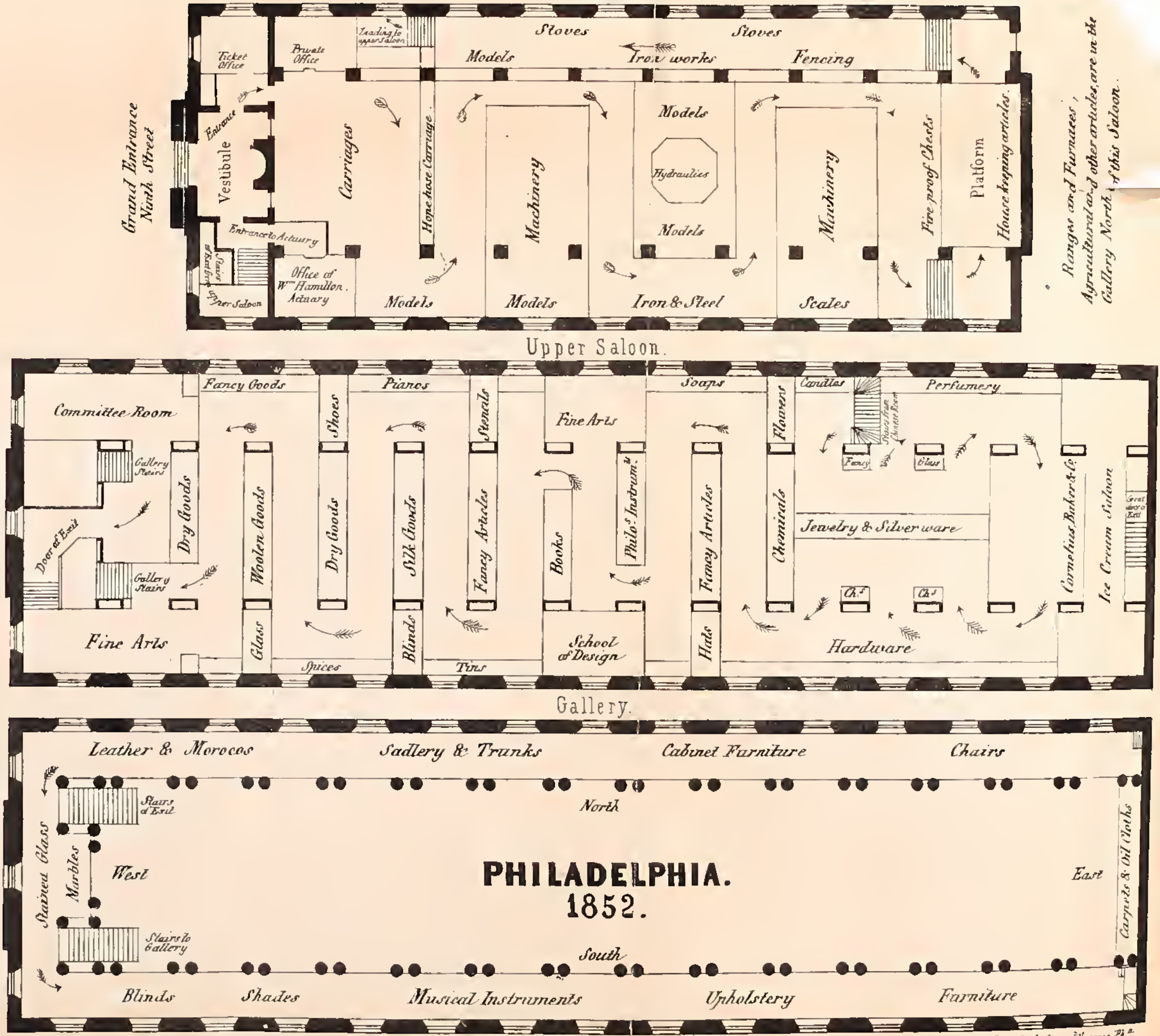
"*The value of design in its bearing on the interests of the laboring population is worthy of notice.* Witnesses pointed out the increased employment of labor, which decorated silks afforded over plain silk fabrics, an increase almost commensurate with the extent and character of the decoration. Plain silks produced by simple machines required but few workmen, and those of the rudest skill; whilst in ornamental fabrics, as the character of the decorative design became elevated and artistic, so not only greater numbers of hands were employed, but even a new scope for the exercise of human ingenuity and skill was created. It is equally so in other manufactures. Take the familiar illustration of cotton printing; the production of a plain fabric does not employ a designer, sketcher, putter-on, engraver, or block printer; and in proportion as the design is ornamental, so is the value of the labor in each of these departments increased. Thus, whilst on the one hand, by the substitution of machine for hand labor, human labor is economized, and the cost of production of simple fabrics is diminished, on the other hand, as soon as the public obtains plain manufactures cheap, it seems to desire, almost by a law of nature, to have them decorated, and thus creates an employment for that labor which otherwise would appear for the time to be superfluous. Again, in proportion as the design is excellent, so is a taste generated on the part of the public, which becomes inevitably a necessity, and multiplies advantages to all parties.

"It may further be observed, that all successful production of ornamental design encourages further production; and Mr. Cole adduced several instances before your Committee, proving almost the generation of new branches of ornamental trade, which had been created by his art manufactures.

"But there is a still further view in which encouragement of ornamental design may be estimated. Improvements in machinery, new discoveries in processes, and in chemical combinations, all have a tendency to encourage repetitions of art in countless phases; such numberless repetitions constitute a strong reason why all the original design employed in them should be beautiful. It is clear that any wide distribution of design must influence the national taste, and it is therefore worth an effort to render original design as perfect as possible.

"Upon the advantages of cultivating the taste of the people, and the moral and elevating influence of taste in legitimately attracting them from degrading objects and pursuits, it must be superfluous to dilate. And your Committee feel that there are no public institutions, which at the present time are more calculated to promote and develope public taste, especially among the laboring classes, than Schools of Design."

Twenty Second Franklin Institute Exhibition.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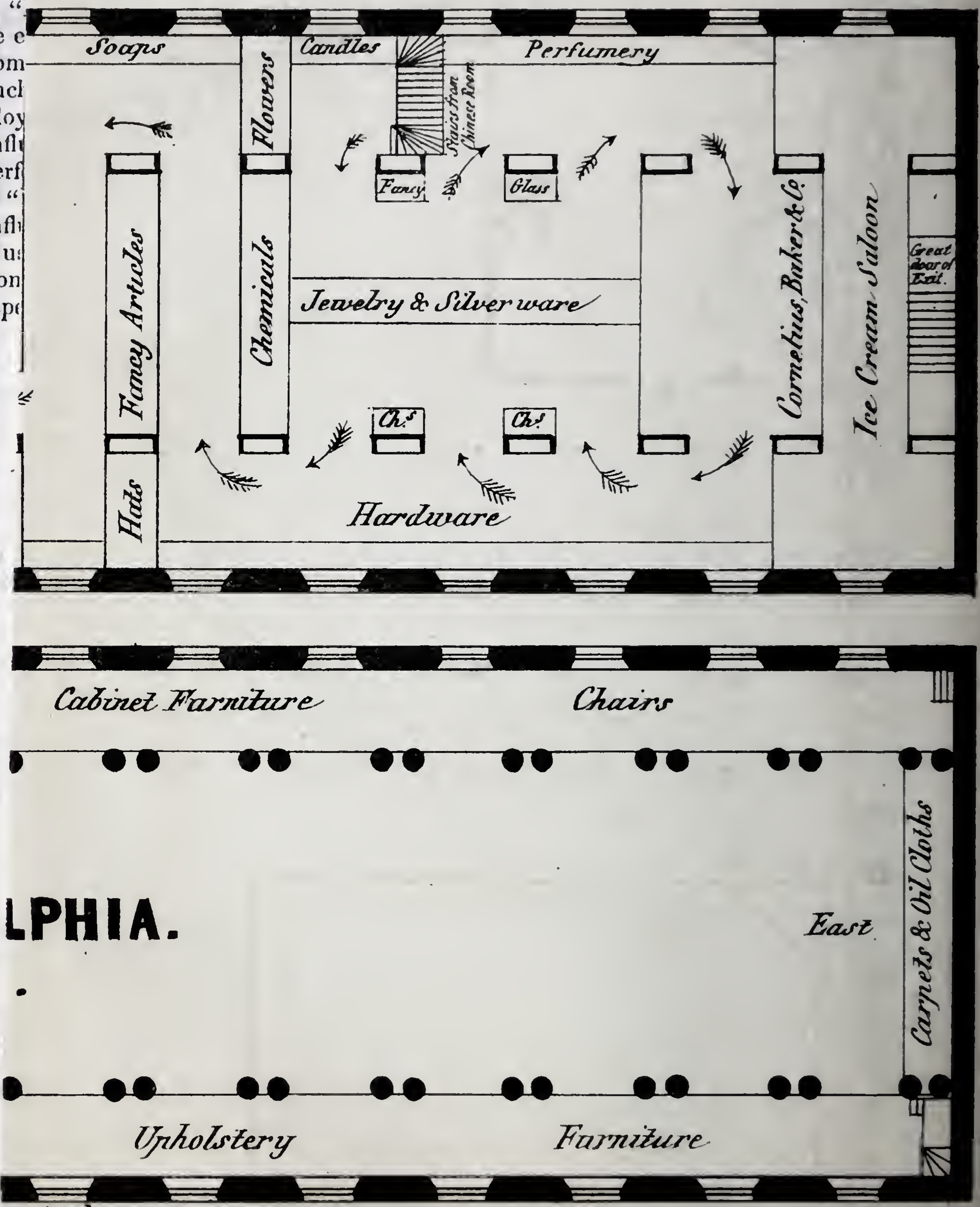

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